IN THE CLAIMS:

1. (Original) In an optical transmission system having an optical transmission terminal with first and second optical interfaces, said first interface being configured to communicate in accordance with an industry-standard, network level protocol, said second interface being configured to communicate in accordance with a first optical layer protocol, an optical transmission span comprising:

an optical interface device that includes:

a third interface communicating with the second interface of the optical transmission terminal in accordance with the first optical layer protocol;

a fourth interface configured to communicate in accordance with a second optical layer protocol; and

a signal processing unit for transforming optical signals between the first and second optical layer protocols;

a test system coupled to the signal processing unit for monitoring optical signal quality;

an optical transmission path optically coupled to the fourth optical interface of the optical interface device for transmitting optical signals in accordance with said second optical layer protocol.

2. (Previously presented) The optical transmission span of claim 1 wherein said third and fourth interfaces are bi-directional interfaces.

3. (Previously presented) The optical transmission span of claim 1 wherein said industry-standard, network level protocol is SONET/SDH.

4. (Previously presented) The optical transmission span of claim 1 wherein said industry-standard, network level protocol is ATM.

5. (Previously presented) The optical transmission span of claim 1 wherein said industry-standard, network level protocol is Gigabit Ethernet.

6. (Previously presented) The optical transmission span of claim 1 wherein said second optical layer protocol includes wavelength division multiplexing.

7. (Previously presented) The optical transmission span of claim 1 wherein said second optical layer protocol supports at least one signal process selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

8. (Previously presented) The optical transmission span of claim 6 wherein said second optical layer protocol supports at least one signal process selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

9. (Previously presented) The optical transmission span of claim 1 wherein said optical transmission path is an undersea optical transmission path.

10. (Previously presented) The optical transmission span of claim 9 wherein said second optical layer protocol is configured for said undersea optical transmission path.

11. (Previously presented) The optical transmission span of claim 1 wherein said signal processing unit performs at least one process on the optical signals selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

12. (Previously presented) The optical transmission span of claim 1 wherein said test system comprises:

    a test signal generator generating an optical test signal;
    an optical coupler combining the test signal with at least one data signal located at a given channel wavelength; and
    an optical performance monitor receiving at least a portion of the optical test signal.

13. (Previously presented) The optical transmission span of claim 12 further comprising at least one optical amplifier located in said optical transmission path, said optical test signal being located at one or more channel wavelengths distinct from the given channel wavelength and corresponding to an idler channel wavelength employed to maintain a prescribed operation state of said at least one optical amplifier

14. (Previously presented) The optical transmission span of claim 12 further comprising:

    at least one optical amplifier located in said optical transmission path;
    at least one optical loopback path associated with said at least one optical amplifier, said at least one optical loopback path optically coupling a first unidirectional optical transmission path to a second unidirectional optical transmission path and wherein said optical performance monitor receives a portion of the optical test signal conveyed over said at least one optical loopback path.

15. (Previously presented) The optical transmission span of claim 12 wherein said test signal generator comprises:

    a tone generator generating a tone having a pseudo-random sequence; and
    an optical transmitter coupled to the tone generator and generating an optical test signal based on the pseudo-random tone;

16. (Previously presented) The optical transmission span of claim 12 wherein said optical performance monitor includes a signal performance monitor for selectively monitoring said one or more channel wavelengths of the test signal and said at least one data signal.

17. (Previously presented) The optical transmission span of claim 12 wherein said signal performance monitor is a Q-monitor.

18. (Original) A method of transmitting an optical signal, said method comprising the steps of:

receiving an optical data signal in accordance with a first optical layer protocol from an optical transmission terminal having first and second optical interfaces, said first interface being configured to communicate in accordance with an industry-standard, network level protocol, said second interface being configured to communicate in accordance with the first optical layer protocol;

transforming the optical data signal so that it is in conformance with a second optical layer protocol; and

directing the transformed optical data signal through an optical transmission path in accordance with the second optical layer protocol;

generating an optical test signal;

directing said optical test signal onto the optical transmission path; and

monitoring a performance characteristic of said optical test signal.

19. (Original) The method of claim 18 wherein said optical transmission path is a bi-directional transmission path.

20. (Original) The method of claim 18 wherein said industry-standard, network level protocol is SONET/SDH.

21. (Original) The method of claim 18 wherein said industry-standard, network level protocol is ATM.

22. (Original) The method of claim 18 wherein said industry-standard, network level protocol is Gigabit Ethernet.

23. (Original) The method of clam 18 wherein said second optical layer protocol includes wavelength division multiplexing.

24. (Original) The method of claim 18 wherein said second optical layer protocol supports at least one signal process selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

25. (Original) The method of claim 24 wherein said second optical layer protocol supports at least one signal process selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

26. (Original) The method of claim 18 wherein said optical transmission path is an undersea optical transmission path.

27. (Original) The method of claim 26 wherein said second optical layer protocol is configured for said undersea optical transmission path.

28. (Original) The method of claim 18 wherein said signal processing unit performs at least one process on the optical data signals selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

29. (Original) The method of claim 18 wherein said optical transmission path includes at least one optical amplifier, said optical test signal being located at one or more channel wavelengths corresponding to an idler channel wavelength employed to maintain a prescribed operation state of said at least one optical amplifier.

30. (Original) The method of claim 18 wherein said monitoring step comprises the step of receiving a portion of the optical test signal that has traversed at least one optical loopback path optically coupling a first unidirectional optical transmission path to a second unidirectional optical transmission path.

31. (Original) The method of claim 18 wherein the step of generating said optical test signal further comprising the steps of:

generating a tone having a pseudo-random sequence; and

generating said optical test signal based on the pseudo-random tone.

32. (Original) The method of claim 31 wherein said performance characteristic is a Q-value.

33. (Original) The method of claim 31 wherein said performance characteristic is selected from the group consisting of a Q-value, a bit error rate, and an optical-signal-to-noise ratio.

34. (Original) The method of claim 18 further comprising the step of monitoring a performance characteristic of said at least one optical data signal.

35. (Original) An optical interface device for use in an optical transmission system having an optical transmission terminal with first and second optical interfaces, said first interface being configured to communicate in accordance with an industry-standard, network level protocol, said second interface being configured to communicate in accordance with a first optical layer protocol, said optical interface device comprising:

a third interface communicating with the second interface of the optical transmission terminal in accordance with the first optical layer protocol;

a fourth interface configured to communicate in accordance with a second optical layer protocol; and

a signal processing unit for transforming optical signals between the first and second optical layer protocols;

a test system coupled to the signal processing unit for monitoring optical signal quality~~;~~.

36. (Original) The optical interface device of claim 35 wherein said third and fourth interfaces are bi-directional interfaces.

37. (Original) The optical interface device of claim 35 wherein said industry-standard, network level protocol is SONET/SDH.

38. (Original) The optical interface device of claim 35 wherein said industry-standard, network level protocol is ATM.

39. (Original) The optical interface device of claim 35 wherein said industry-standard, network level protocol is Gigabit Ethernet.

40. (Original) The optical interface device of claim 35 wherein said second optical layer protocol includes wavelength division multiplexing.

41. (Original) The optical interface device of claim 35 wherein said second optical layer protocol supports at least one signal process selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

42. (Original) The optical interface device of claim 40 wherein said second optical layer protocol supports at least one signal process selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

43. (Original) The optical interface device of claim 35 wherein said optical transmission path is an undersea optical transmission path.

44. (Original) The optical interface device of claim 43 wherein said second optical layer protocol is configured for said undersea optical transmission path.

45. (Original) The optical interface device of claim 35 wherein said signal processing unit performs at least one process on the optical signals selected from the group consisting of gain equalization, bulk dispersion compensation, optical gain, Raman amplification, dispersion slope compensation, PMD compensation, and performance monitoring.

46. (Original) The optical interface device of claim 35 wherein said test system comprises:

a test signal generator generating an optical test signal;
an optical coupler combining the test signal with at least one data signal located at a given channel wavelength; and
an optical performance monitor receiving at least a portion of the optical test signal.

47. (Original) The optical interface device of claim 46 further comprising at least one optical amplifier located in said optical transmission path, said optical test signal being located at one or more channel wavelengths distinct from the given channel wavelength and corresponding to an idler channel wavelength employed to maintain a prescribed operation state of said at least one optical amplifier

48. (Original) The optical interface device of claim 47 further comprising:

at least one optical amplifier located in said optical transmission path;

at least one optical loopback path associated with said at least one optical amplifier, said at least one optical loopback path optically coupling a first unidirectional optical transmission path to a second unidirectional optical transmission path and wherein said optical performance monitor receives a portion of the optical test signal conveyed over said at least one optical loopback path.

49. (Original) The optical interface device of claim 46 wherein said test signal generator comprises:

a tone generator generating a tone having a pseudo-random sequence; and

an optical transmitter coupled to the tone generator and generating an optical test signal based on the pseudo-random tone;

50. (Original) The optical interface device of claim 35, an optical transmission span wherein said optical performance monitor includes a signal performance monitor for selectively monitoring said one or more channel wavelengths of the test signal and said at least one data signal.

51. (Original) The optical interface device of claim 50, an optical transmission span wherein said signal performance monitor is a Q-monitor.

52. (Previously presented) In an optical transmission system having a selected one of any of a plurality of different optical transmission terminals each with first and second optical interfaces, each of said first interfaces being configured to communicate in accordance with an industry-standard, network level protocol, each of said second interfaces being configured to communicate in accordance with a different first optical layer protocol, an optical transmission span comprising:

an optical interface device that includes:

a third interface communicating with the second interface of a selected one of any of the optical transmission terminals in accordance with the first optical layer protocol employed by the selected optical transmission terminal;

a fourth interface configured to communicate in accordance with a second optical layer protocol; and

a signal processing unit for transforming optical signals between the first and second optical layer protocols;

a test system coupled to the signal processing unit for monitoring optical signal quality;

an optical transmission path optically coupled to the fourth optical interface of the optical interface device for transmitting optical signals in accordance with said second optical layer protocol.